# Paediatrics and Binocular Vision

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- Why test children?
- Important tests
- Supplementary tests
- Case studies

# Why test children?

# Why test children?

- Interesting
- Worthwhile
- Professional challenge
- Add value to the practice

- Early detection and management may allow development of normal binocular vision

# Why test children?

Population Studies show:

- Refractive error in children (up to 12%)
- Strabismus (Up to 8%)
- Amblyopia in children (Up to 5%)

# History and Symptoms

- Reason for visit?
  - ?Problems with school work/reading/writing
  - ?Abnormal visual behaviour
  - ?Eyes turning
- Birth history – Normal pregnancy? Normal delivery? Premature? Special Care?
- General Health
- Family history – spectacles/occlusion/surgery

- Observation – head posture/facial assymmetry

# Important Tests – The Vital 5

- Vision
  - Preferential looking eg cardiff cards
  - Picture cards eg kay/lea symbols
  - Letter charts eg crowded logmar
  - **Or objection to occlusion**
  - **Singles or crowded**
- Cover test (Cover/uncover, alternate cover test)
  - Accommodative target where possible
- Motility
  - Especially underacting superior obliques / overacting inferior obliques
  - **Ab** and **add**uction (looking for Duanes and VIth nerve Palsies)
- Stereopsis
  - Lang, Frisby TNO
- Refraction

# Refraction… CHOICES?

- Distance fixation and subjective?
- Mohindra technique –
  - TOTAL DARKNESS
  - Occlude other eye
  - Wait for pupils to dilate and remain dilated – constriction=accommodation
  - For WD 50cm take off 1.00D for patients over 2 years (Or 0.75 for patients under 2 years)
- CYCLOPLEGIC REFRACTION
- http://www.youtube.com/watch?v=jP8_NlD6S_E

# Supplementary tests

- Convergence
- Accommodation
- AC/A Ratio
- 20Δ Base Out test
- 4 Δ Base out test (Microtropia)
- Hirschberg test (Corneal reflexes – 1mm ~ 20 Δ)
- Fusional Reserves

# When to refer

- Reduced Vision <6/9
- Squinters
- Any incomittant deviation
- Other signs??

# Case 1 - AC

- Female, Aged 5
- Failed school screening

- Mum notices LE turning in occasionally

# Case 1 - AC

- Vision in clinic
  R 6/12 L 6/38 (Crowded logMAR)
- CT D and N
  Small esophoria with poor recovery
- OM Full
- Stereo – 200” arc (Randot only)

- Cyclopentolate 1% R and L
- Found RE +5.00DS LE +6.50/-1.00x180

- **REDUCED VA (L>R) AND STEREOPSIS**
- **No manifest squint**

# Case 1 - AC

- Follow up visit after 3 months
- **Mum says LE turning in more when not wearing spectacles**
- VAs

  R 6/7.5 L 6/19
- CT with specs
  - N and D small esophoria
- CT without specs
  - N Moderate LCS
  - D Small LCS
- OM Full
- Stereo (with specs) – 100”
- **LVA has improved – Start occlusion**

# Case 1 - AC

- Follow up visit after 6 weeks
- Good occlusion compliance
- VAs

  R 6/7.5 L 6/9.5

- CT (With specs)
  - D Minimal esophoria
  - N Minimal esophoria

- OM Full

  - **Squint well controlled with spectacles**
  - **Fully accommodative LCS**
  - **VAs improving**
  - **Continue occlusion**

# Case 2 - FG

- Male, age 5
- Failed school check
- No parental concerns

# Case 2

- Vision in clinic
  R 6/18 L 6/12 (Crowded logMAR)
- CT D and N
  Small exophoria (Good recovery)
- OM Full
- Stereo – 200” arc (Randot only)

- Cyclopentolate 1% R and L
- Found RE +2.00/-3.00x180 LE +2.00/-2.00x180

- **Reduced VAs**
- **Significant Astigmatism**

# Case 2 - FG

- Follow up visit after 3 months

- VAs

  R 6/12 L 6/7.5
- CT with specs
  - N and D small exophoria

- OM Full
- Stereo (with specs) – 100"

- **Significant astigmatism ?anisometropic amblyopia**
- **Takes time for VAs to improve**
- **Occlude if monoc amblyopia – otherwise full spec Rx and observe.**
- **Continue spec wear and review in 2-3 months**

# Case 3 - EH

- Female Age 2
- Referred by health visitor

- Parents notice ?RE turning in
- Otherwise fit and well

# Case 3 - EH

- FH Brother – spectacles age 4 ?squint
- Vision - objects to occlusion of LE
  - RE 6/60 LE 6/7.5 (Crowded Kays)
- CT
  - N Sl/moderate RCS
  - D Small RCS
- OM - full
- Stereo – No response on Lang
- Cyclopentolate 1% R and L
- Found RE +3.50/-0.50x 15 LE +1.50

- **RCS and reduced R vision**

# Case 3 - EH

- Wearing spectacles full time
- RCS noticed with and without specs

- VAs R 6/24 L 6/6

- CT without specs
  - D Moderate RCS
  - N Marked RCS

- CT with specs
  - D Small/moderate RCS (~25 Δ Base Out)
  - N Moderate RCS (~40Δ Base Out)

- **Constant RCS (With accommodative element)**
- **R Amblyopia**
- **Occlusion 6 hours/day**

# Case 3 - EH

- Wearing spectacles full time. Occlusion compliance reasonable

- VAs R 6/15 L 6/6

- CT with specs
  - N Moderate RCS (~35Δ Base Out)
  - D Small RCS

- **RVAs improved. Continue occlusion 6 hours/day**

# Case 3 - EH

- 2 visits later
- Wearing spectacles full time. Occlusion compliance reasonable

- VAs R **6/7.5 L 6/6**

- Good VAs

- CT with specs
- D Small RCS
- N Moderate RCS (~35Δ Base Out)

- **RVAs improved. Taper occlusion**

- **? Future Surgery**
- **Bilateral medial rectus recession**

# Case 4 - EM

- Age 8
- Mum concerned re: poor reading
- EM c/o blurred vision

- Used to read recreationally – less interested now

# Case 4 -EM

- Vision R 6/6 L 6/6
- CT
  - N Sl/Moderate Exophoria with poor recovery
  - D Small Exophoria (good recovery)

- OM Full
- Stereo 30” Randot

- Convergence – to 16cm (LE diverges)
- Accommodation
  - R 18cm recovers @ 24cm
  - L 16cm recovers @ 20cm
  - BEO 16cm recovers @ 22cm

- Cycloplegic refraction
- R and L +0.25DS

- **Convergence and accommodation insufficiency**
- **Exercises**

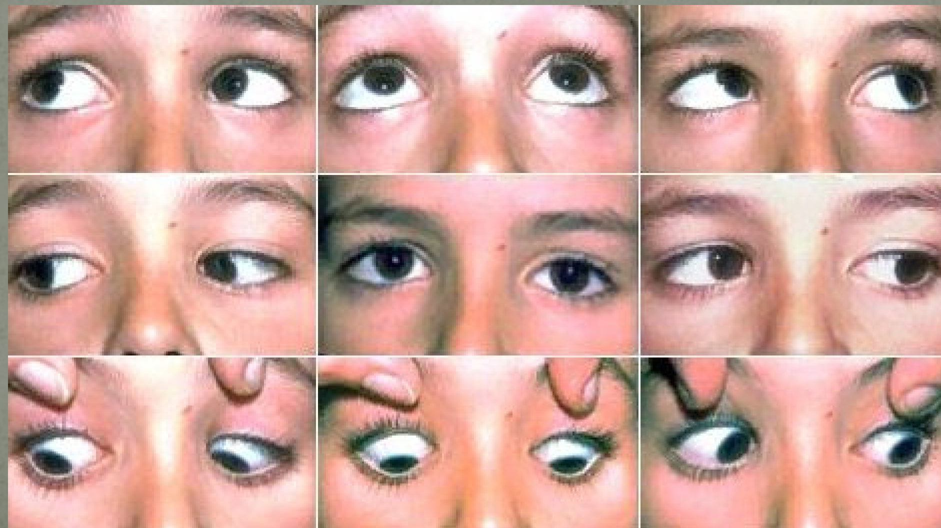
# Case 4 - EM

- Hart Chart
- Smooth Convergence exercises

- 2 x day with relaxation

# Case 6 - JI

- Referred by optom
- Reduced RVA (? Amblyopia) and R hypertropia



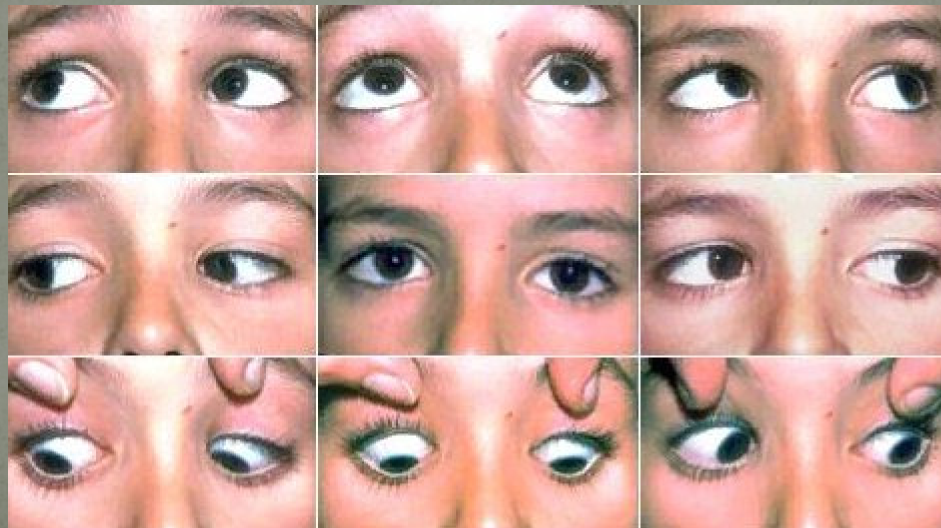
# Case 6 - JI

- 12 year old female
- Unremarkable history
- Previous eye examinations but ? Some spectacles give headaches. Specs now lost and c/o headaches after close work
- Mum notices RE updrift occassionally
- Vision R 6/38  L 6/7.5
- CT D and N Small Right hypertropia
- OM
  - Underacting right SO
  - Overacting right IO
  - Overacting left IR
- Convergence – R eye elevates
- PCT
  - N 14 R/L
  - D 8 R/L
- Head tilt to the left
- Cycloplegic refraction RE +0.75/-0.50x180 LE +0.50

- **Underacting R SO**
- **Reduced RVA**
- **Head tilt**

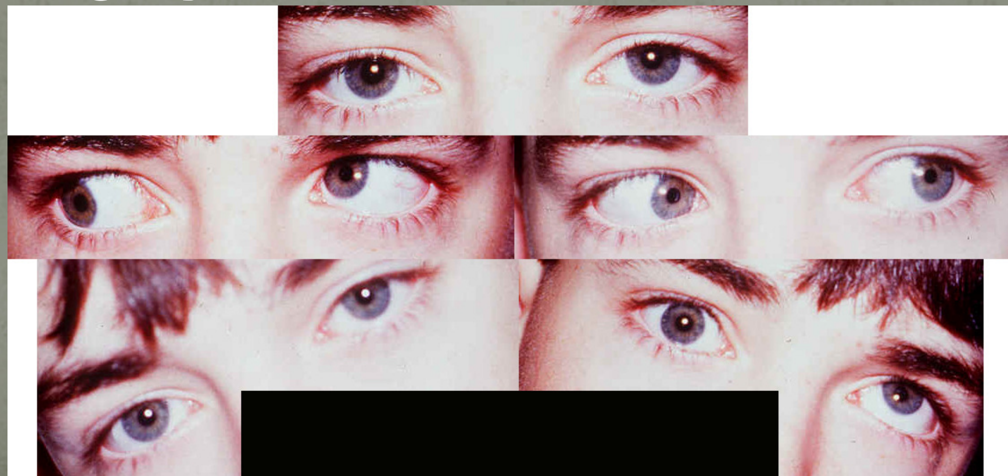
# Case 6 - JI

- Congenital IVth – head tilt AWAY from affected eye (Bielschowsky head tilt test – deviation increases with head tilt towards affected eye)
- OM Underacting RSO
- Upshoot on left gaze – overacting RIO



# Case 6 - JI

- Longstanding – Good suppression
- Controlled with head tilt
- But symptomatic – Increased workload at school – lots of reading etc
- Given specs. Advised regular breaks.
- ? Future surgery?



# Case 7 - CV

- 6 year old female
- Referred by optom for ? Squint ? Amblyopia
- No history of note

# Case 7 - CV

- VAs R +2.50 6/7.5 L +3.00 6/12
- Unaided Vision RE 6/7.5 LE 6/7.5 (Clog)
- CT
  - N small esophoria with good recovery
  - D small esophoria with good recovery
- OM – Restriction of LLR
- Stereo – 70” arc (Randot)
- Cyclopentolate 1% R and L
- Found RE +1.50 LE +1.50
- **Restricted LLR**
- **DUANES or VIth nerve palsy**
- **Slight palpebral fissure change**

# Case 7 - CV

- Features of Duanes Retraction Syndrome
- IIIrd nerve misdirection in lieu of VIth
- Co-contraction of MR and LR
- Various degrees of limited **AB** and **AD** Duction
- +/- upshoots and downshoot
- **Globe retraction**

- Straight in primary position
- Good VAs and No amblyopia
- No treatment required.

# Case 8 - BM

- First eye test age 6
- Referred by optom due to reduced vision RE

- Nil else of note

# Case 8 - BM

- Visions
- R 6/12 L 6/6
- CT
  - N ?flick esoT
  - D Small esophoria
- OM Full
- Stereo Randot 200”
- Cycloplegic refraction
  - RE +3.50/-1.00x180 LE +2.00

- Anisometropia
- Reduced RVA
- ?Microtropia

# Case 8 - BM

- Follow up visit after 3 months
- Visions
- R 6/9.5 L 6/6
- CT
  - N Small esophoria
  - D Small esophoria
- OM Full
- Stereo Randot 140”

- RVA still reduced
- Stereo Reduced
- Continue full-time spec wear
- ?Microtropia